Service Manual

74 PMD 222/02B

Portable cassette Recoder

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marantz®

model PMD 222

First issue: 1991

4822 725 50945

MZ 2927

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Telex: 35000 PHTC NL routing IND NLMTFAT

MARANTZ
700 NORTH COMMERCE STREET
AURORA, ILLINOIS 60504
U.S.A.
Phone : (708)820-4800
Telefax : (708)820-8103

ORDERING PARTS:

Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified.
The following information must be supplied to eliminate delays in processing your order:
1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

PARTS ORDERING

Parts may be ordered at the following addresses:

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A 1101 Wien
Austria
Telex: 132.332

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1720 Groot-Bijgaarden
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Telex: 24466

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Casilla 2687
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Telex: 240.239

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DIVISION OF PHILIPS
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France
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The Netherlands
Telex: 4748

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MARANTZ
DIVISION OF PHILIPS A/S
Sandstuveien 40
0680 Oslo 6
Norway
Telex: 72640

GREAT BRITAIN
MARANTZ AUDIO U.K. Ltd
Unit 15/16
Saxon Way Industrial Estate
Moor Lane
Harmondsworth UB7 OLW
Great Britain
Telex: 935196

GREECE
SHERTON ELECTRONICS S.A.
P.O.Box 21025
Hippocratus Street 188
Athens 11471
Greece
Telex: 216.795

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MARANTZ JAPAN, Inc.
35-1, 7-chome, Sagamiono
Sagamihara-shi, Kanagawa
Japan

KUWAIT
AL ALAMIAH ELECTRONICS
Ussama Building
Fahd al Saleem Street
P.O.Box 23781
Safat-Kuwait
Telex: 22694

ITALY
MARANTZ ITALIANA S.P.A.
Via Chiese, 74
20126 Milano
Italy

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P.O.Box 5954
University Street
Riyadh 11432
Saudi Arabia
Telex: 401530

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DIVISION OF PHILIPS S.A.
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Newville 21114
South Africa

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PHONO S.A.
Ignacio Iglesias 10
Badalona (Barcelona)
Spain
Telex: 59355

SWEDEN
MARANTZ
DIVISION OF PHILIPS
Försäljning AB
Tegeluddsvägen 1
S-115 84 Stockholm
Sweden
Telex: 14060

SWITZERLAND
MARANTZ
Technischer Service
Duenstrasse 3
3186 Düdingen
Switzerland

TURKEY
DOGRUOL Ltd.
I.M.C.
6 Blok N°6310
Unkapani
Istanbul
Turkey
Telex: 22085

MALTA
CACHIA & GALEA
Republic Street, 68D
Valetta
Telex: 1682

PORTUGAL
MARANTZ
Divisao philips S.A. service
Outurela-carnaxide
2795 LinDA-A-VELHA
Telex: 43906

CANADA
NORESCO
50 Wingold Avenue
Toronto, Ontario
Canada M6B 1P7

All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please, contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at abovementioned address.

1. TECHNICAL SPECIFICATIONS

Tape Drive System	Single Capstan Drive
Cartridge	Philips type compact cassette
Track System	2-track 1-channel
Tape Speed	1-7/8 ips and 15/16 ips
Heads	3 Head System
	Record: Super Hard Metal Alloy
	Playback: Super Hard Metal Alloy
	Erase: Dual Gap Metal Alloy
Motor	DC Servo Motor

Frequency Response:

	Standard Speed 1-7/8 ips (±3 dB)	Long Play 15/16 ips (±3 dB)
Normal Tape	40 Hz ~ 12.5 kHz	40 Hz ~ 6.5 kHz
CrO_2 Tape	40 Hz ~ 14 kHz	40 Hz ~ 7.5 kHz
Metal Tape	40 Hz ~ 15 kHz	40 Hz ~ 8.5 kHz

Signal to Noise Ratio:

Normal Tape	55 dB
CrO_2 Tape	57 dB
Metal Tape	57 dB

Wow and Flutter (WRMS)

Standard Speed 1-7/8 ips	0.12%
Long Play 15/16 ips	0.15%

Output Level/Impedance

Line	650 mV/2 k ohms
Headphone	280 mV/8 ohms

Input Sensitivity/Impedance

Line	40 mV/56 kohms
Microphone	0.3 mV/9 k ohms

General:

Power Requirements	120 V, 50/60 Hz
Battery Requirements (RB430 Battery Pack Optional)	3 D Cells or RB430 Rechargeable Battery Pack

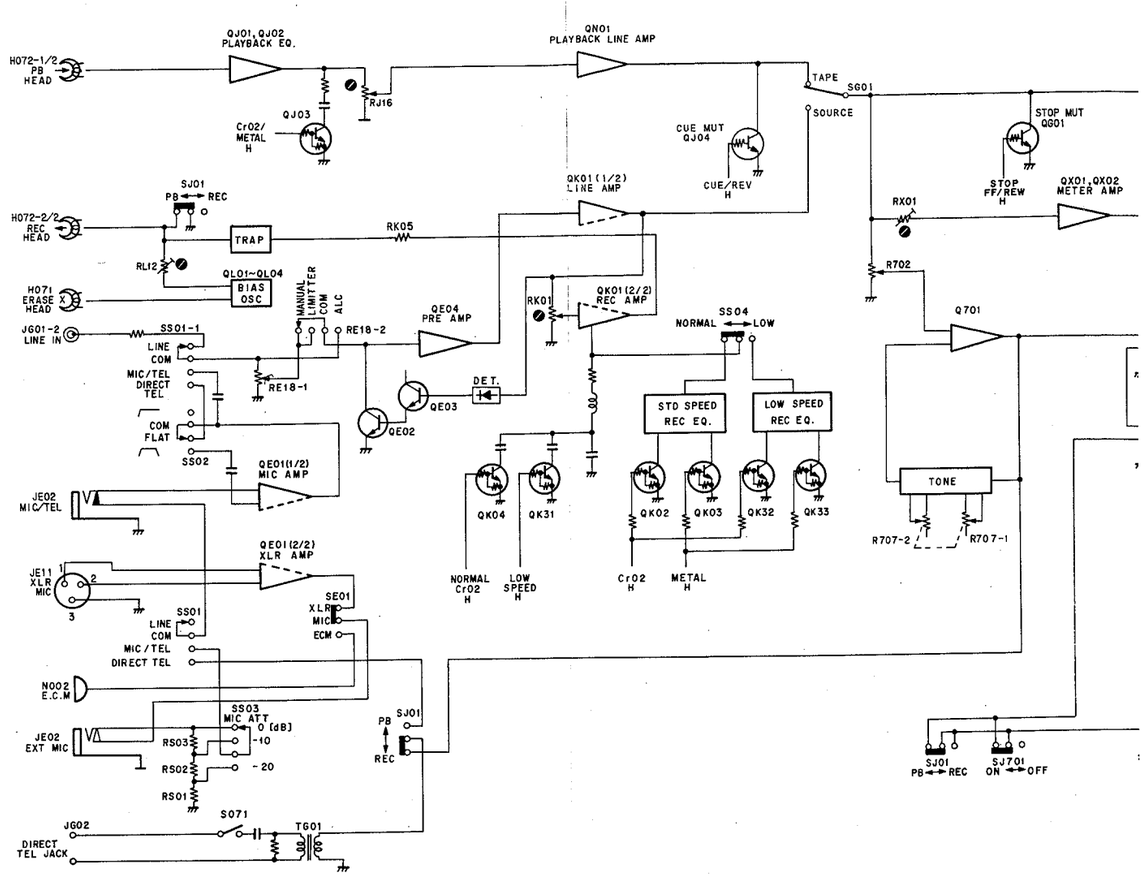
Battery Life

With Alkaline Batteries	
Playback Time	7.5 Hours
Recording Time with Metal Tape	5.5 Hours
With RB430 Battery Pack (optional)	
Playback Time	4.5 Hours
Recording Time with Metal Tape	4.0 Hours

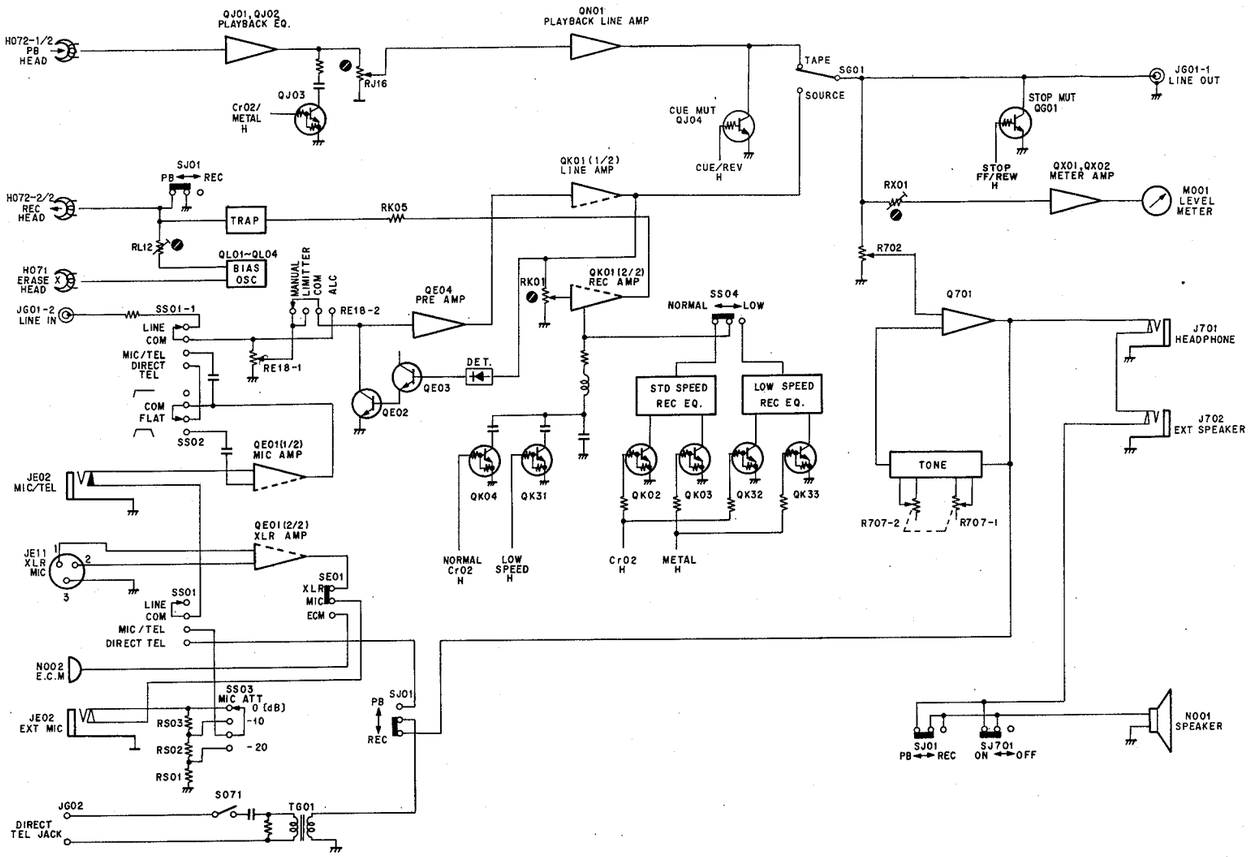
Unit Dimensions and Weight

Width	228 mm (9")
Heigth	51 mm (2")
Depth	165 mm (6.5")
Weight	1.3 kg (2.87 lbs.)

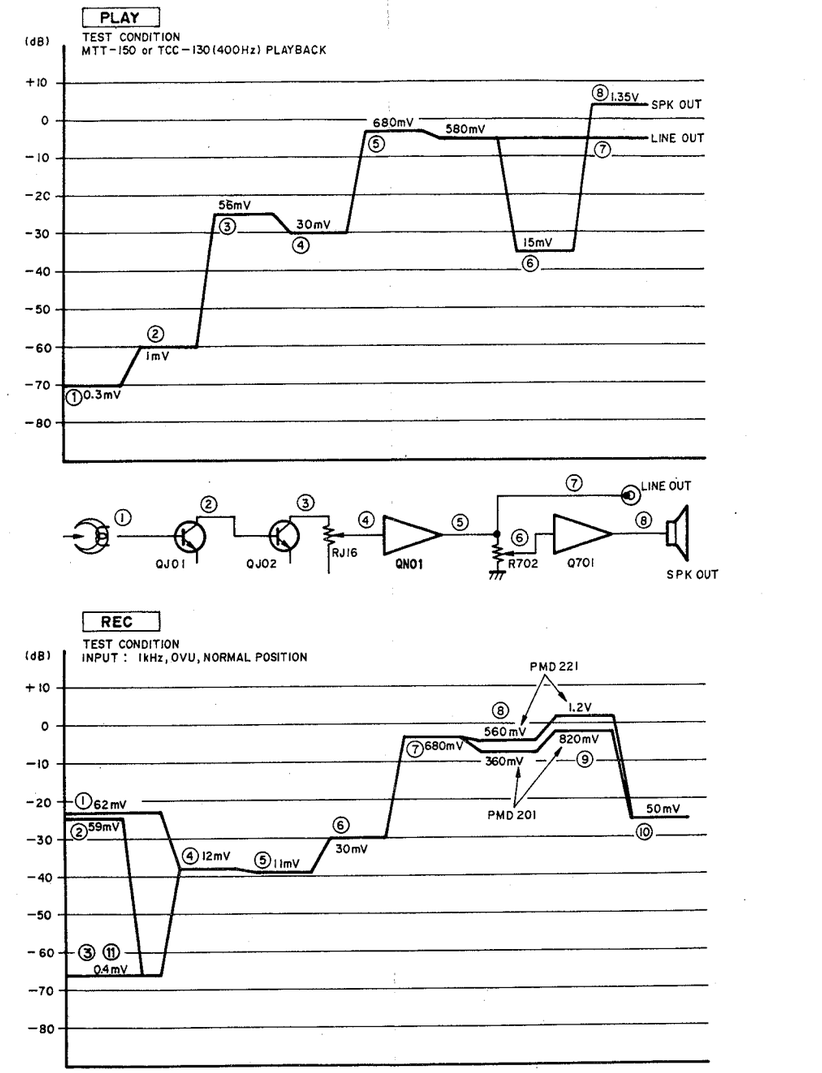
2. BLOCK DIAGRAM

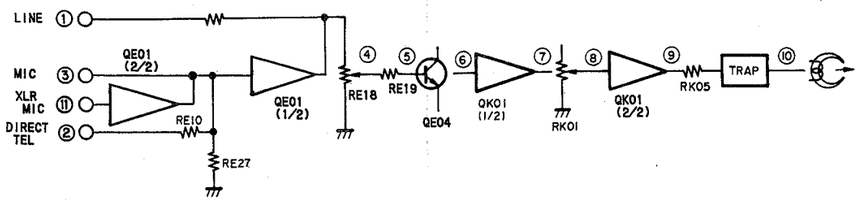


2. BLOCK DIAGRAM

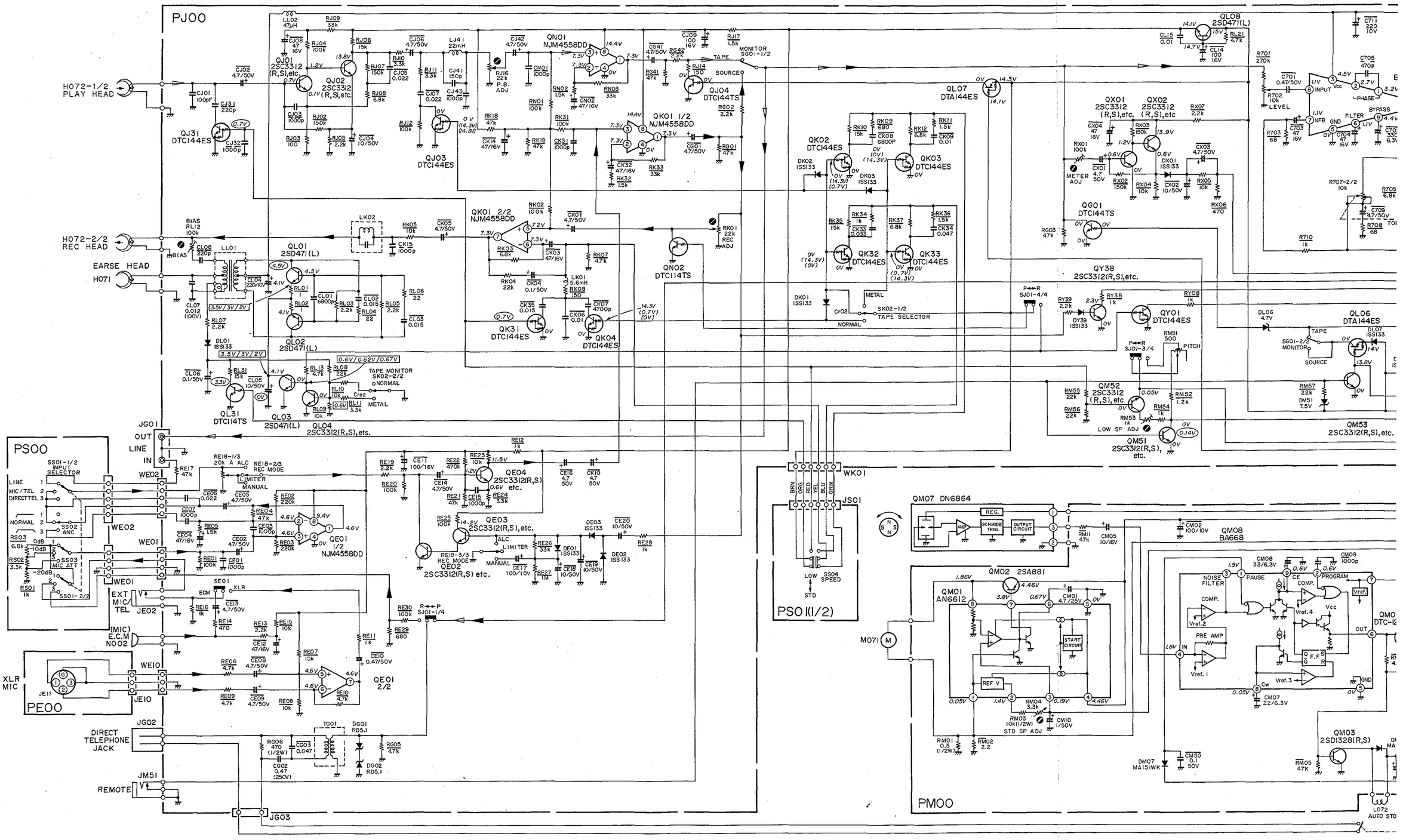


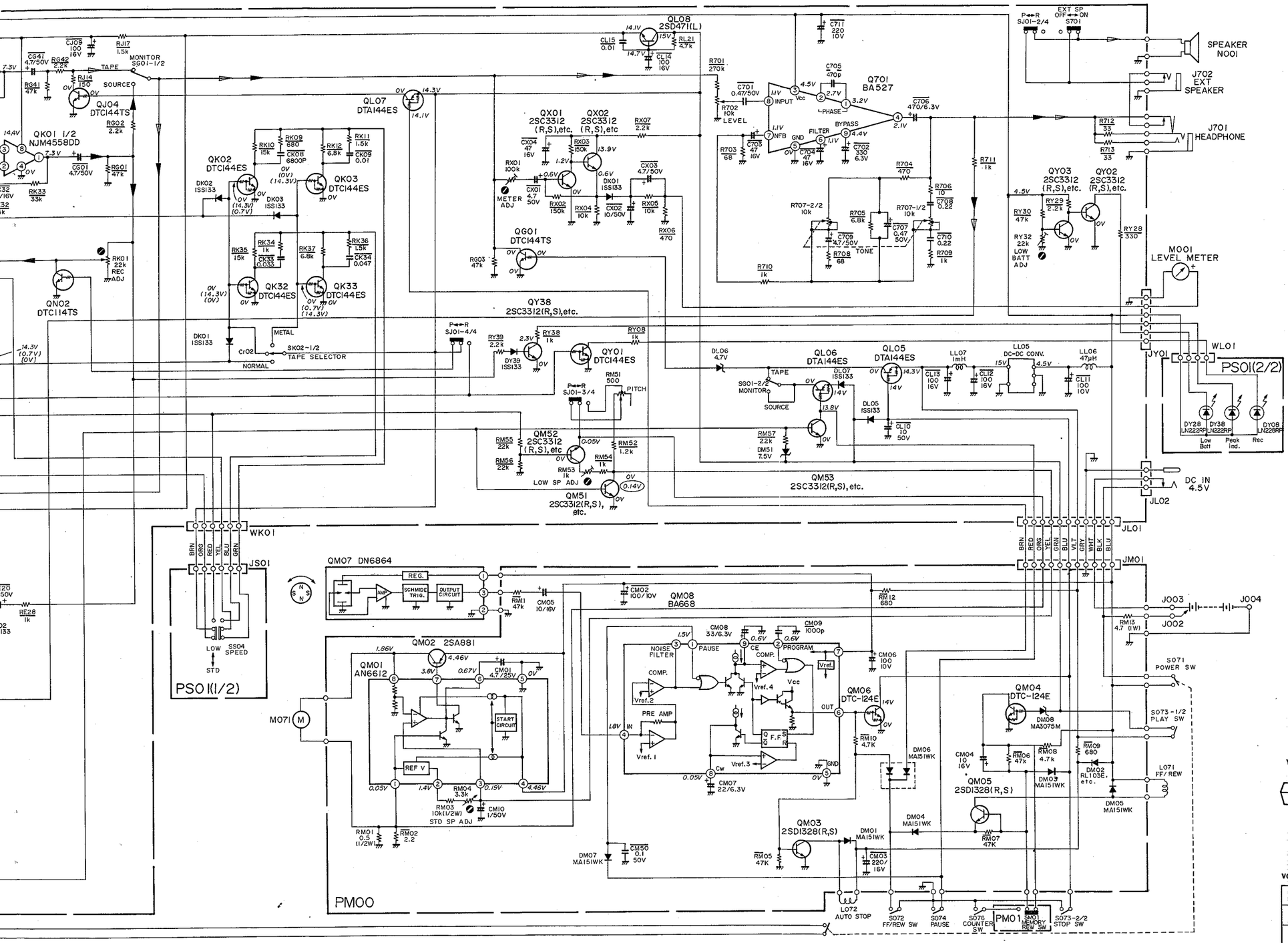
3. LEVEL DIAGRAM

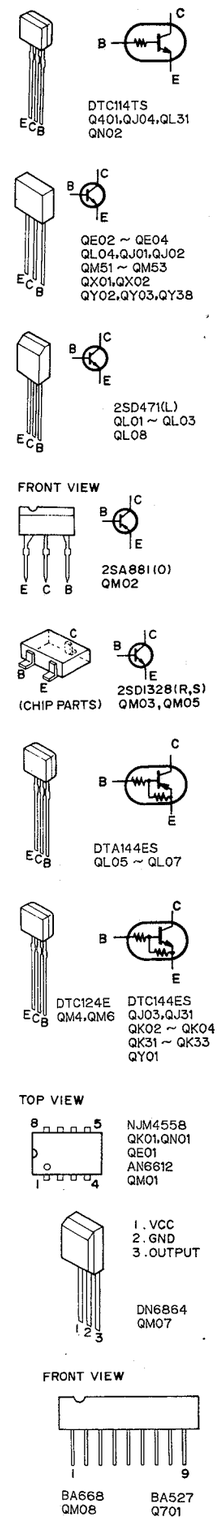




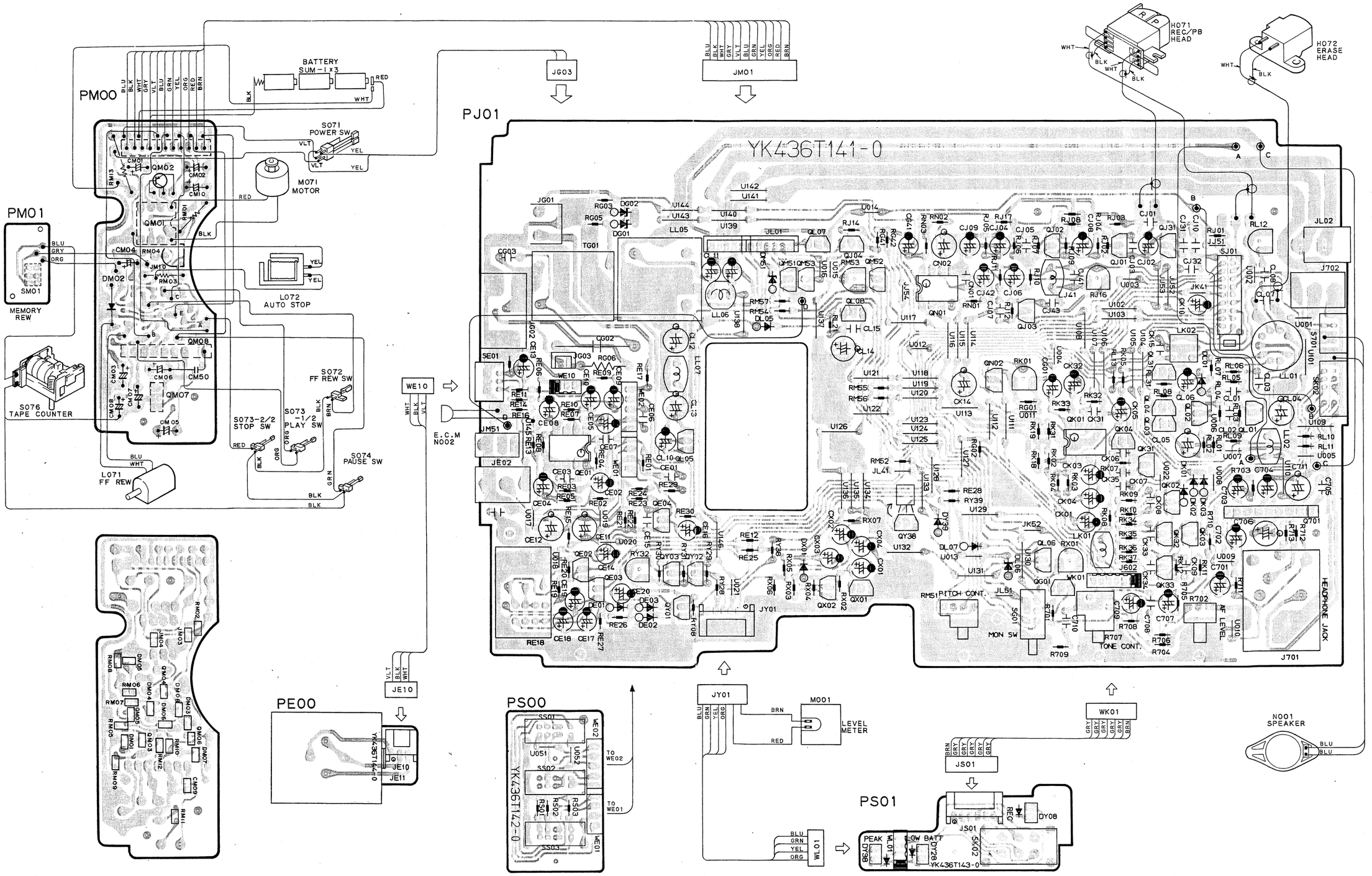
4. SCHEMATIC DIAGRAM



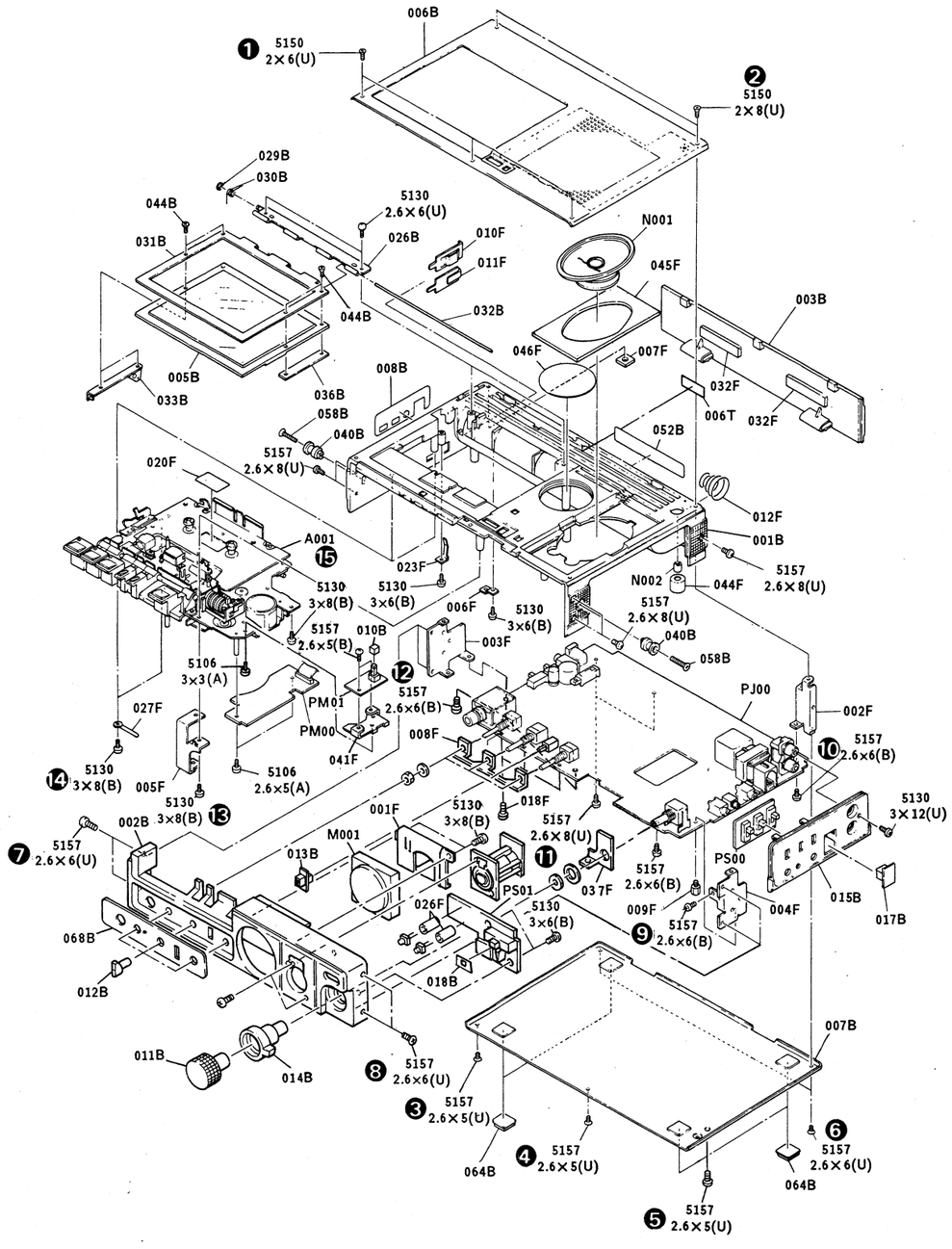

QL08 2SD471(L)
QL07 DTA144ES
QK01 1/2 NJM4558DD
QN02 DTC114TS
QJ04 DTC144TS
QK02 DTC144ES
QK03 DTC144ES
QK32 DTC144ES
QK33 DTC144ES
QX01 2SC3312 (R,S),etc.
QX02 2SC3312 (R,S),etc
QG01 DTC144TS
QY38 2SC3312(R,S),etc.
QY01 DTC144ES
QL06 DTA144ES
QL05 DTA144ES
QM52 2SC3312 (R,S),etc
QM51 2SC3312(R,S), etc.
QM53 2SC3312(R,S), etc.
Q701 BA527
QY03 2SC3312 (R,S),etc.
QY02 2SC3312 (R,S),etc.
SPEAKER N001
J702 EXT SPEAKER
J701 HEADPHONE
M001 LEVEL METER
PS01(2/2)
DC IN 4.5V
JL02
JL01
JM01
WK01
JS01
PS01(1/2)
M071
QM07 DN6864
QM08 BA668
QM02 2SA881
QM01 AN6612
QM06 DTC-124E
QM04 DTC-124E
QM05 2SD1328(R,S)
QM03 2SD1328(R,S)
PM00
S071 POWER SW
S073-1/2 PLAY SW
L071 FF/REW
S073-2/2 STOP SW
L072 AUTO STOP
S072 FF/REW SW
S074 PAUSE
S076 COUNTER SW
SM01 MEMORY REW SW
J003
J004
J002
TAPE SELECTOR
METAL
NORMAL
TAPE
SOURCE
MONITOR
PITCH
LOW SP ADJ
REC ADJ
LEVEL METER
LOW BATT ADJ
TONE
STD SP ADJ
LOW SS04 SPEED
STD
DC-DC CONV.
Low Batt
Peak Ind.
Rec
BRN ORG RED YEL BLU GRN
BRN RED ORG YEL BLU VLT GRY WHT BLK BLU


DTC114TS
Q401,QJ04,QL31
QN02
QE02 ~ QE04
QL04,QJ01,QJ02
QM51 ~ QM53
QX01,QX02
QY02,QY03,QY38
2SD471(L)
QL01 ~ QL03
QL08
FRONT VIEW
2SA881(O)
QM02
(CHIP PARTS)
2SD1328(R,S)
QM03,QM05
DTA144ES
QL05 ~ QL07
DTC124E
QM4,QM6
DTC144ES
QJ03,QJ31
QK02 ~ QK04
QK31 ~ QK33
QY01
TOP VIEW
NJM4558
QK01,QN01
QE01
AN6812
QM01
Mark Plate
1: Vcc
2: GND
3: Output
1 . VCC
2 . GND
3 . OUTPUT
DN6864
QM07
VOLTAGE
( ) = CrO2
[ ] = METAL
= LOW SPEED
NOR CrO2 ME
FRONT VIEW
BA668
QM08
BA527
Q701
NOTE:
PLAY SIGNAL LINE
REC SIGNAL LINE

5. CIRCUIT BOARD DIAGRAM



6. EXPLODED VIEW/DISASSEMBLY AND PARTS LIST



DISASSEMBLY

1. Removing the cover(A) : Top (006B)
   Remove the 5 screws ❶ and ❷.

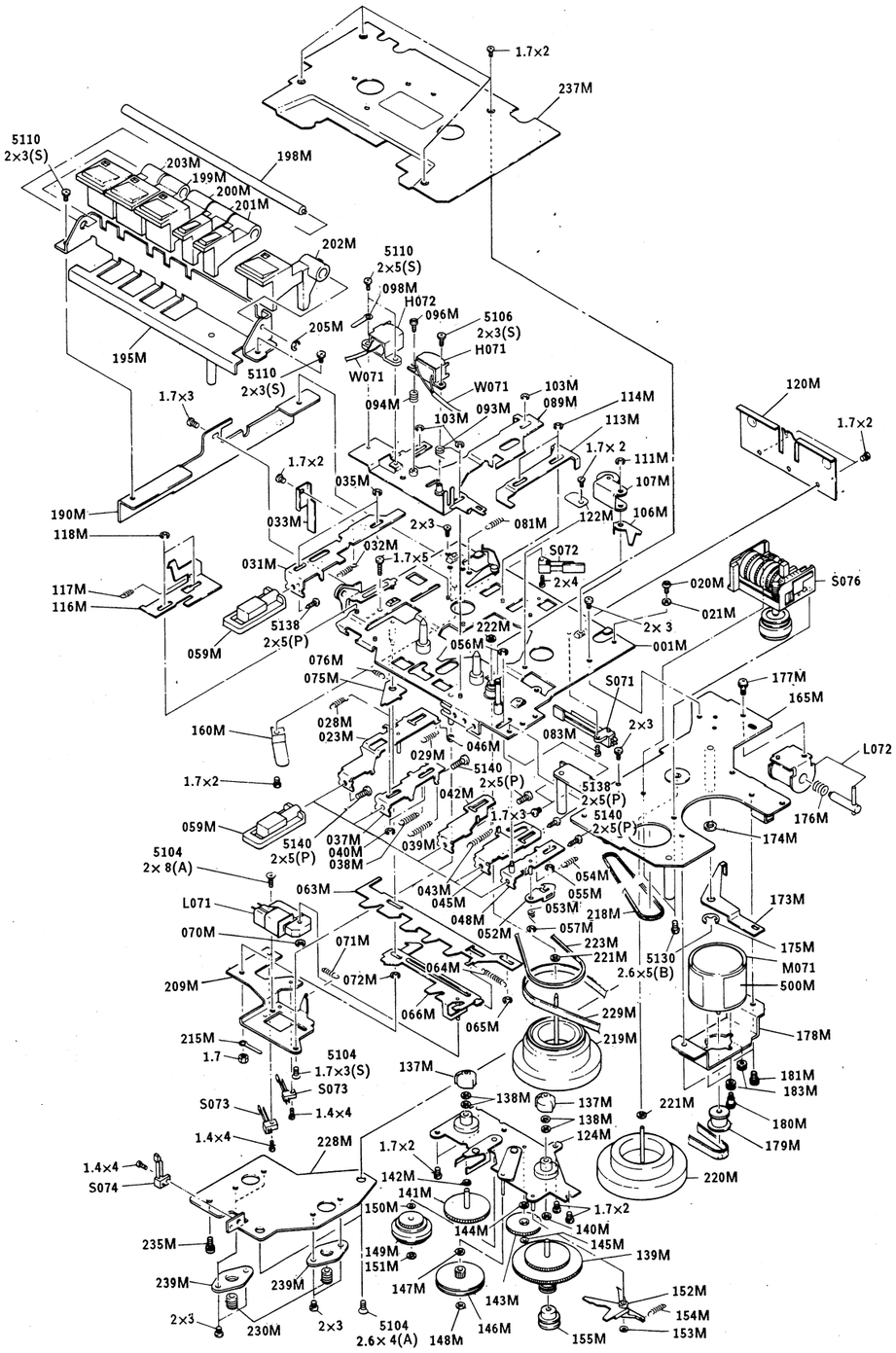
2. Removing the cover(B) : Bottom (007B)
   Remove the 5 screws ❸, ❹, ❺ and ❻.

3. Removing the front panel (002B)
   1) Remove the knob (011B), (014B) and (012B).
   2) Remove the 4 screws ❼ and ❽.

4. Removing the main P.C. Board (PJ00)
   1) Remove the stud (009F)
   2) Remove the 6 screws ❾, ❿, ⓫ and ⓬.

5. Removing the mechanism (A001)
   Remove the 4 screws ⓭, ⓮ and ⓯.

REF. DESIG.	PART NO.	DESCRIPTION
001B	4822 443 40888	Case (A), Top
002B	4822 443 41009	Front Panel
003B	4822 426 50757	Lid, Battery
005B	4822 443 63337	Lid, (C) Cassette
006B	4822 443 63335	Cover (A), Top
007B	4822 443 63336	Cover (B), Bottom
008B	4822 459 11037	Label, Case (A)
010B	4822 410 61337	Memory REW Button
011B	4822 413 41656	Knob, REC Level
012B	4822 413 41655	Knob, LEVEL, TONE, PITCH, REC MODE
013B	4822 412 20076	Knob, TAPE, SOURCE
014B	4822 413 41657	Knob REC mode mold
015B	4822 347 10312	Indicator, For Side(R)/02B
017B	4822 462 71649	Cap, Indicator/02B
018B	4822 347 10313	Indicator For Tape speed
026B	4822 417 10854	Hinge Ass'y (A)
029B	4822 532 11301	RG Ring, E
030B	4822 492 41426	Spring
031B	4822 417 10853	Hinge (B)
040B	4822 532 11254	Collar
044B	4822 502 12163	F.H.M. Screw F2×4
058B	4822 502 13776	F.H.M. Screw F3×18
064B	4822 462 40869	Leg, Cover (B)
068B	4822 347 10309	Indicator Front
010F	4822 290 60593	Terminal (+)
011F	4822 290 60594	Terminal
012F	4822 290 40212	Terminal (-)
018F	4822 502 30401	P. Tapped Screw P2.6×4
020F	4822 380 20226	Reflector
023F	4822 492 41427	Spring
A001		Mechanism Assembly
M001	4822 347 10303	V.U. Meter
N001	4822 240 30543	Speaker 4Ω 0.5W
N002	4822 242 30206	Mic Unit, ECM
001T	4822 736 21138	User Manual
001V	4822 498 20097	Strap
ZA01	4822 263 50114	A.C. Adaptor/02B



REF. DESIG.	PART NO.	DESCRIPTION
020M	4822 502 13773	Screw
021M	4822 532 11285	Washer
025M	4822 403 70395	STOP/EJECT Select Cam
026M	4822 535 93241	FIX S/E Select Cam
028M	4822 492 41462	Spring, S/F Select Cam
029M	4822 492 33146	Spring, Stop Lever
032M	4822 492 33149	Spring, REC Lever
034M	4822 502 13774	REC SW S1.7×2
035M	4822 532 52213	RG Ring, REC Lever
038M	4822 492 33152	Spring, Head Base
039M	4822 492 41463	Spring, FWD Lever
040M	4822 532 52213	RG Ring, FWD Lever
043M	4822 492 41465	Spring, REW Lever
046M	4822 492 41658	Spring, FF Lever
052M	4822 403 40299	Arm, Pause Lock Cam
053M	4822 492 41424	Spring, Pause Lock Cam
054M	4822 492 33147	Spring, Pause Lever
055M	4822 532 52213	RG Ring, Pause Lever
056M	4822 532 52212	RG Ring, Pause Lever
057M	4822 532 52213	RG Ring, Pause Cam
063M	4822 522 31987	Cam, Lock Plate
064M	4822 492 41429	Spring, Lock Plate
065M	4822 532 52213	RG Ring, Lock Plate
066M	4822 522 31988	Cam, QMS Lock Plate Ass'y
070M	4822 532 52213	RG Ring, E
071M	4822 492 41466	Spring, QMS Lock Plate
072M	4822 532 52212	RG Ring, Lock Plate
076M	4822 492 41467	Spring, REC Inter Lock
081M	4822 492 33151	Spring, REC Safety
083M		F.H.M. Screw F1.7×3
093M	4822 492 33273	Spring, Pinch Roller
094M	4822 492 41432	Spring, Azimuth
096M	4822 502 13595	Screw, Azimuth
103M	4822 532 52213	RG Ring, Head Base
107M	4822 403 53998	Arm Ass'y, Pinch Roller
111M	4822 532 52213	RG Ring, Pinch Arm
114M	4822 532 52213	RG Ring, Switch C/R Lever
117M	4822 492 41468	Spring, Hook Lever
118M	4822 532 52213	RG Ring, Hook Lever
120M	4822 492 41418	Spring, Cassette Back
137M	4822 528 10777	Hub, Take-Up & S Reel Cap
138M	4822 532 11286	Washer, Under Reel Cap
139M	4822 522 31989	Gear, Take-Up Reel Gear Ass'y
140M	4822 532 11285	Washer, Under Clutch
141M	4822 522 31991	Gear, Supply Reel Gear Ass'y
142M	4822 532 11285	Washer, Under Supply Reel Ass'y
143M	4822 522 31994	Gear, FF
144M	4822 532 11285	Washer, Under FF Gear
145M	4822 532 52209	Washer, FF Gear
146M	4822 528 50198	Pulley, FWD Idler
147M	4822 532 11291	Washer, Under FWD Idler
148M	4822 532 52208	Spacer, FWD Idler
149M	4822 528 50199	Center Pulley Ass'y
150M	4822 532 52207	Spacer, Under C Clutch
151M	4822 532 52208	Spacer, C Pulley Ass'y

REF. DESIG.	PART NO.	DESCRIPTION
152M	4822 403 40219	Arm, Shut Off
153M	4822 532 52211	Washer, Shut OFF Arm
154M	4822 492 41422	Spring, Shut OFF Arm
155M	4822 528 50193	Pulley, Counter Pulley
160M	4822 492 41419	Spring, Leaf
174M	4822 532 11396	Washer, Auto Stop Link
175M	4822 532 11296	RG Ring, Auto Stop Link
176M	4822 492 41421	Spring, Auto Stop Solenoid
177M	4822 502 12426	L. Washer Screw L2.6×4
179M	4822 528 50326	Motor Pulley 2400RPM
180M	4822 502 13775	Screw, Motor
181M	4822 502 12426	L. Washer Screw L2.6×4
183M	4822 532 11956	Bushing, Motor
199M	4822 410 24504	Button, Stop
200M	4822 410 24505	Button, FWD
201M	4822 410 24506	Button, REW & FF
202M	4822 410 24507	Button, Pause
203M	4822 410 24508	Button, REC
205M	4822 532 52212	RG Ring, Button Shaft
218M	4822 358 30523	Belt, Counter
219M	4822 528 60319	Flywheel Ass'y, Main
220M	4822 528 60234	Flywheel Ass'y, Sub
221M	4822 532 11291	Washer, Under Flywheels
222M	4822 532 51805	Spacer, Oil Fence
223M	4822 358 30533	Belt, Drive
229M	4822 358 30522	Belt, Main
230M	4822 403 52724	Adjuster
235M	4822 502 12426	L. Washer Screw L2.6×4
239M	4822 403 52968	Retainer
H071	4822 249 10436	REC/Play Head
H072	4822 249 40194	Erase Head
L071	4822 281 30176	Solenoid Coil, QMS Auto REW
L072	4822 281 30179	Solenoid Coil, Auto Stop
M071	4822 361 60338	D.C. Motor
S071	4822 271 30701	Mini Switch, Motor
S072	4822 276 11618	Mini Switch, F/R
S073	4822 271 30699	Mini Switch, Play/Stop
S074	4822 271 30699	Mini Switch, Pause
S076	4822 349 50232	Counter

7. SHOCK, FIRE HAZARD SERVICE TEST

CAUTION: After servicing this appliance and prior to returning to customer, measure the resistance between either primary AC cord connector pins (with unit NOT connected to AC mains and its Power switch ON), and the face or front Panel of product and controls and chassis button.

Any resistance measurement less than 1 Megohms should cause unit to be repaired or corrected before AC power is applied, and verified before return to user/customer.

Ref. UL Standard NO. 1270. Para 66. 3. D (Mandatory Test after servicing Electrical Appliances, effective 7-1-83).

8. P.C. BOARDS

As can be seen from the circuit diagram, the chassis of your Cassette Recorder consists of the following units. Each unit mounted on a printed circuit board is described within the square enclosed by a bold dotted line on the circuit diagram.

1. Rec/Play Amp ..... Mounted on P.C. Board PJ00
2. Switch Board ..... Mounted on P.C. Board PS00
3. Mecha Control ..... Mounted on P.C. Board PM00
4. Speed Switch ..... Mounted on P.C. Board PS01
5. Memory Switch ..... Mounted on P.C. Board PM01
6. XLR Connector ..... Mounted on P.C. Board PE00

9. TEST EQUIPMENT REQUIRED FOR SERVICING

For measuring or checking your Cassette Deck, the following instruments and materials are necessary:

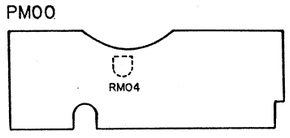
- VTVM
- Audio Oscillator (AF OSC)
- Attenuator (600 Ω)
- Oscilloscope
- Bandpass Filter (1 kHz)
- IEC A-Curve Filter
- Wow and Flutter Meter
- Torque Meter (Cassette Type)
- Digital Frequency Counter
- Distortion Meter
- Blank Tapes (Completely erased with bulk eraser)
  TDK AC-224 (Normal)
  TDK AC-513 (Special/CrO_2)
  TDK AC-712 (Metal)

NOTE:
If any doubt is noted in a measured value, use new tape.

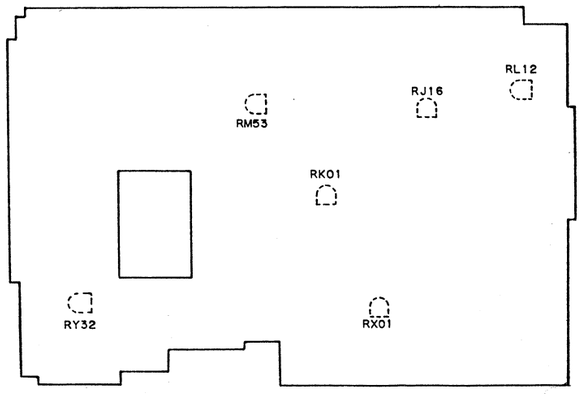
- Test Tapes (New Tape)
  TCC-111•MTT-111 Wow and Flutter, Tape Speed
  MTT-111-SP Low Speed
  TCC-140•MTT-112B Signal-to-Noise Ratio
  TCC-130•MTT-150 Adjustment of Output Level
  TCC-161•MTT-256 Frequency Response (for Normal)
  TCC-261•MTT-356 Frequency Response (for Special/CrO_2 and Metal)
  TCC-192•MTT-121 Cross Talk
  TCC-194•MTT-141 Channel Separation
  (A-BEX)•(TEAC)

Alignment Points

PM00



PJ00

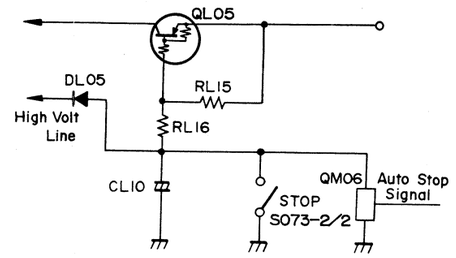


10. MECHANISM AND CIRCUIT DESCRIPTION

10.1 Muting System

The muting circuit is provided to reduce the pops noise when generates on the Line Out at power ON/OFF.

1) **When power is turned on .....**
   As the emitter voltage of QL05 is higher than the base voltage during the charge current flows to CL10 through RL15 & RL16, QL05 is ON and it sends the muting voltage.
   CL10 has been charged up, both the base and the emitter voltages of QL05 are equal. QL05 is OFF and the muting is released.
2) **When the STOP button is depressed .....**
   When the stop switch S073-2/2 is ON, the base current flows through. Also discharging CL10, QL05 is ON instantly, the muting system operates to reduce the pops noise at power ON/OFF.
   QM06 provides to discharge CL10 on AUTO STOP.
   As the muting time is in proportional to capacitance of CL10, it is preset by matching the threshold time of TAPE EQ Amp.
   DL05 provides to discharge CL10 on FF and REW.



10.2 Auto Play and Automatic Rewind Stop

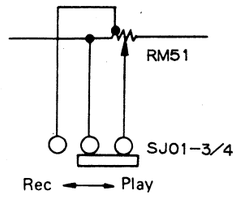
With SS01 set to ON during PLAY, the rewind button will lock when pressed. When counter reaches 999, the rewind lock releases and the PLAY operation resumes. In this condition, both CUE and REVIEW buttons do not operate and both buttons are locked. Also, when the FF button is pressed and locked in place, the lock releases when the counter reaches "900" and the PLAY mode is entered. When the tape has finished winding in both modes before the counter reaches the respective positions, the AUTO STOP function and all buttons are released. Also when the REWIND button alone is locked, the tape rewinds and rewind stops when the counter reaches "999". The same applies for fast foward operation which stops at "900". When the counter is between "900" and "999", both REWIND and FF buttons do not lock.

10.3 Auto Stop

The AUTO STOP function which detects the end of the tape is carried out by hole IC (QM07). The signal from QM07 is added to the pin ④ of QM08, while the auto stop duration is designated inside QM08. The time it takes for the auto stop function to activate after the tape stops, is determined in CM08. At this time TE is TE = 75 x CM08 (μF)mSec, while TW is TW = 30 x CM07 (μF)mSec as long as the auto stop function is operating. When it does not shut off the first time, TE--TW--TE--TW is repeated until it shuts off.

10.4 Pitch Control

The pitch control is used to vary the tape speed for playback operation. During recording, it is automatically set to the RM51 center position by SJ01-3/4

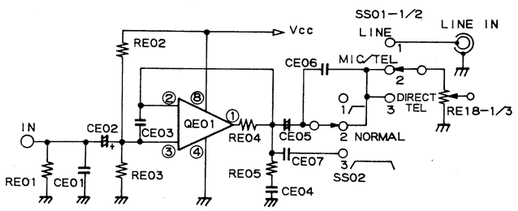


10.5 Ambient Noise Control (ANC)

ANC changes the bandwidth of the signals with the Mic Amp.

1. High pass
2. Normal
3. Band pass

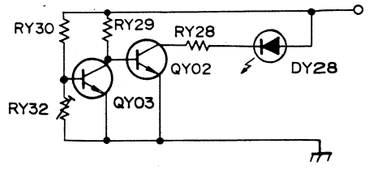
CE06 and RE18-1/3 determine the Low Frequency cut. The NF volume of CE07 determines the High Frequency cut.



10.6 Low Battery Indicator

This circuit illuminates the LED when the supply voltage level is attenuated.

The dividing ratio for RY30 and RY32 determines the voltage at which the light is illuminated.
LED (DY28) is lit up when the base voltage of QY03 is less than about 0.6V.



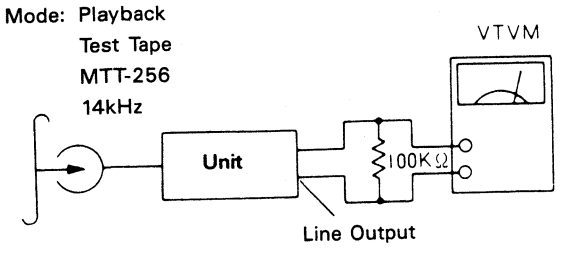
11. ELECTRICAL ADJUSTMENTS

Precautions for Adjustment and Measurement

1. Before playing back the test tape, thoroughly demagnetize the heads, capstan and similar metal parts using an erase, as the test tape-recorded tone is easily erased.
2. Do not place the test tape on any measuring instrument.
3. Do not put the test tape near a place where the eraser is used.
4. Method of Demagnetization: Turn the eraser power switch on at a position far away from the heads. Bring the eraser close to the heads, capstan and other parts to be demagnetized, and move it up and down four or five times to demagnetize. Slowly separate the eraser far away from the parts, and turn the power switch off.
5. Do not use any magnetized adjusting tool. If necessary, demagnetize with a bulk eraser from time to time in the course of each adjustment.
6. Do not turn semi-fixed resistor or coil more than needed.
7. Measure speed and wow and flutter in the normal operating state.
8. Do not apply locking bond excessively.

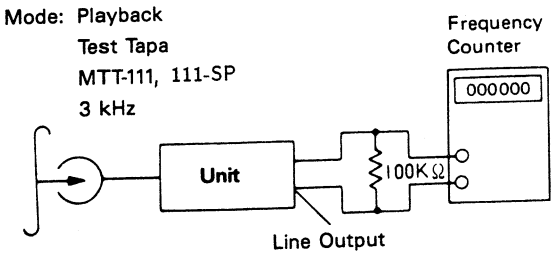
11.1 Head Azimuth Adjustment

1. Play the test tape MTT256 back. Adjust the head azimuth adjusting screw for maximum VTVM reading.
2. After adjustment, repeat the playback and stop settings several times to confirm no azimuth deviation.
3. After adjustment, lock the screws with bond.



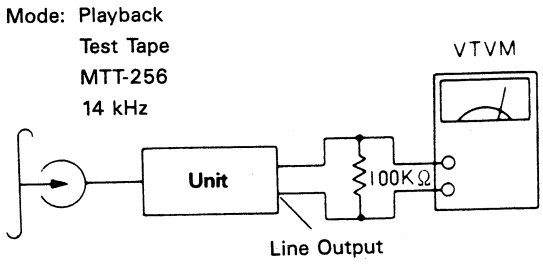
11.2 Tape Speed Adjustment

1. Adjust the RM51 to the center position.
2. Play the 3kHz signal of the test tape MTT-111 back.
3. Adjust the adjusting resistor (RM04) on the PM00 P.C. Board so that counter readings are between 2990 — 3010Hz.
4. Then, adjust the Speed Selector Switch to LOW PLAY, and play MTT-111-SP back.
5. Adjust the adjusting resistor (RM53) on the PJ00 P.C. Board so that the counter readings are between 2900 — 3010 Hz.



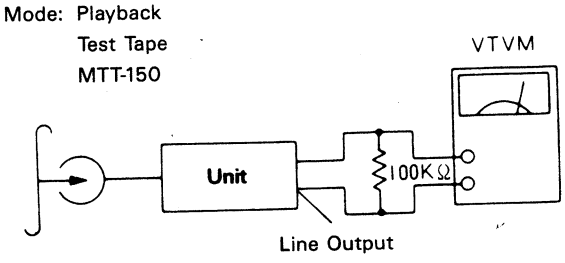
11.3 Playback Equalizer Measurement

1. Adjust the tape selector switch to NORMAL.
2. Play the 315Hz signal of the test tape MTT-256 back. The VTVM at OdB.
3. Play the 12.5kHz signal of the test tape back. Confirm a frequency response of 0 to 2dB in reference to the 315Hz signal level. Then, play the 12,5kHz signal back. Set the tape selector to CrO_2, Metal. Confirm the 12.5kHz signal readings at — 4.5dB, ± 1dB.



11.4 Playback Level Adjustment

1. Adjust the Tape Selector Switch to NORMAL and turn the NR switch OFF.
2. Play the test tape MTT-150 back. Adjust RJ16 on the PJ00 P.C. Board so that the voltage of Line output is 580mV.



11.5 Level Meter Adjustment

1. Adjust the Tape Selector Switch to NORMAL.
2. Play the test tape MTT-150 back. Adjust RX01 on the PJ00 P.C. Board at 0dB Level Meter reading.

11.6 Playback Noise Measurement

1. Set the selector switch to NORMAL.
2. Play back the blank tape and make sure that the noise volume is below 2mV when the REC LEVEL Knob is set to both maximum and minimum.

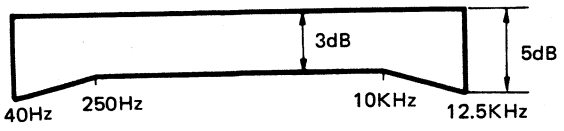
NOTES:

1. Perform measurements when the power hum is a at minimum.
2. Perform measurements under conditions where induction noise will not affect measurements.

11.7 Record/Playback Frequency Response and Recording Level Adjustment

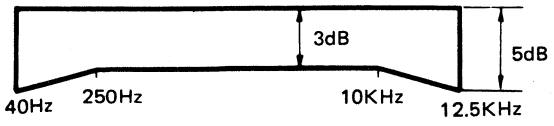
[NORMAL]

1. Set the tape selector switch to NORMAL.
2. Insert the AC-224 test tape in the cassette holder and set the recording conditions. (Set the monitor switch to SOURCE) and attenuate from 1kHz, 580mV to − 25dB on Line Out.
3. Rewind and play the tape back, then set RL12 so that the level of 1kHz is brought within ±0.5dB.
4. When playing the tape back, set RK01 so that the level of 1kHz is the same as that on the Rec Monitor.
   Change the Monitor Switch to TAPE SOURCE, and set RK01 so that the level of 1kHz is the same as that before.
5. After making these adjustments, record and play back at 1kHz, 10kHz, 12.5kHz. Make sure results comply with the following diagram.



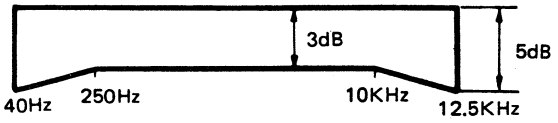
[CrO_2]

1. Set the tape selector switch to CrO_2.
2. Insert the AC-513 test tape in the cassette holder and set the recording conditions. Attenuate from 580mV to − 25dB on Line Out with the attenuator and record at 1kHz, 10kHz, and 12.5kHz on an unrecorded section of the tape.
3. Record and playback at 1kHz, 10kHz, and 12.5kHz.
   Make sure results comply with the following diagram.



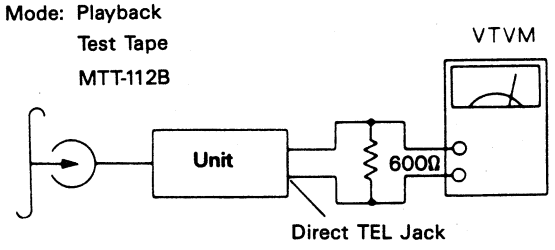
[METAL]

1. Adjust the Tape Selector Switch to METAL.
2. Load the test tape AC-712 into cassette holder. Perform measurements as with CrO_2, and make sure they conform with the Chart.



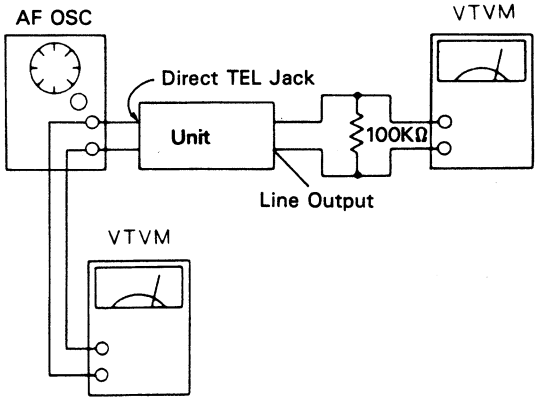
11.8 Direct Telephone Output Measurement

1. Play the test Tape MTT-112B back.
2. Perform measurements of the output voltage on the Direct TEL Jack, when the Monitor volume is at the maximum setting.



11.9 Direct Telephone Input Measurement

1. Set the recording conditions, and adjust the Monitor Switch to SOURCE.
2. Set the Rec Level to maximum, the Rec Mode to MANUAL.
3. Add a 1kHz signal to Direct TEL Jack, and set the input signal to attenuate from 580mV to −3dB on Line Output.



12. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W

① — Resistance value

Examples

① Resistance value

0.1Ω...001	10Ω...100	1kΩ...102	100kΩ...104
0.5Ω...005	18Ω...180	2.7kΩ...272	680kΩ...684
1Ω...010	100Ω...101	10kΩ...103	1MΩ...105
6.8Ω...068	390Ω...391	22kΩ...223	4.7MΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1----370, Ceramic condenser
Disc type
①② Temp. coeff. P350 ~ N1000, 50V
Capacity value
Tolerance

Examples

① Tolerance (Capacity deviation)
±0.25pF...0
±0.5pF...1
±5%...5

* Tolerance of COMMON PARTS handled here are as follows:
0.5pF ~ 5pF...±0.25pF
6pF ~ 10pF...±0.5pF
12pF ~ 560pF...±5%

② Capacity value

0.5pF...005	3pF...030	100pF...101
1pF...010	10pF...100	220pF...221
1.5pF...015	47pF...470	560pF...561

C***: CERAMIC CAP.
(1) DK16---300, High dielectric constant ceramic condenser
Disc type
① Temp. chara. 2B4, 50V
Capacity value

Example

② Capacity value

100pF...101	1000pF...102	10000pF...103
470pF...471	2200pF...222	

C***: ELECTROLY CAP. (⧺), FILM CAP. (≒)
(1) EA------10, Electrolytic condenser
One-way lead type, Tolerance ±20%
①② Dielectric strength
Capacity value

Examples

① Capacity value

0.1μF...104	4.7μF...475	100μF...107
0.33μF...334	10μF...106	330μF...337
1μF...105	22μF...226	1100μF...108
		2200μF...228

② Working voltage

6.3V...006	25V...025
10V...010	35V...035
16V...016	50V...050

(2) DF15---350, Plastic film condenser
One-way type, Mylar ±5% 50V
① Capacity value

Examples

① Capacity value

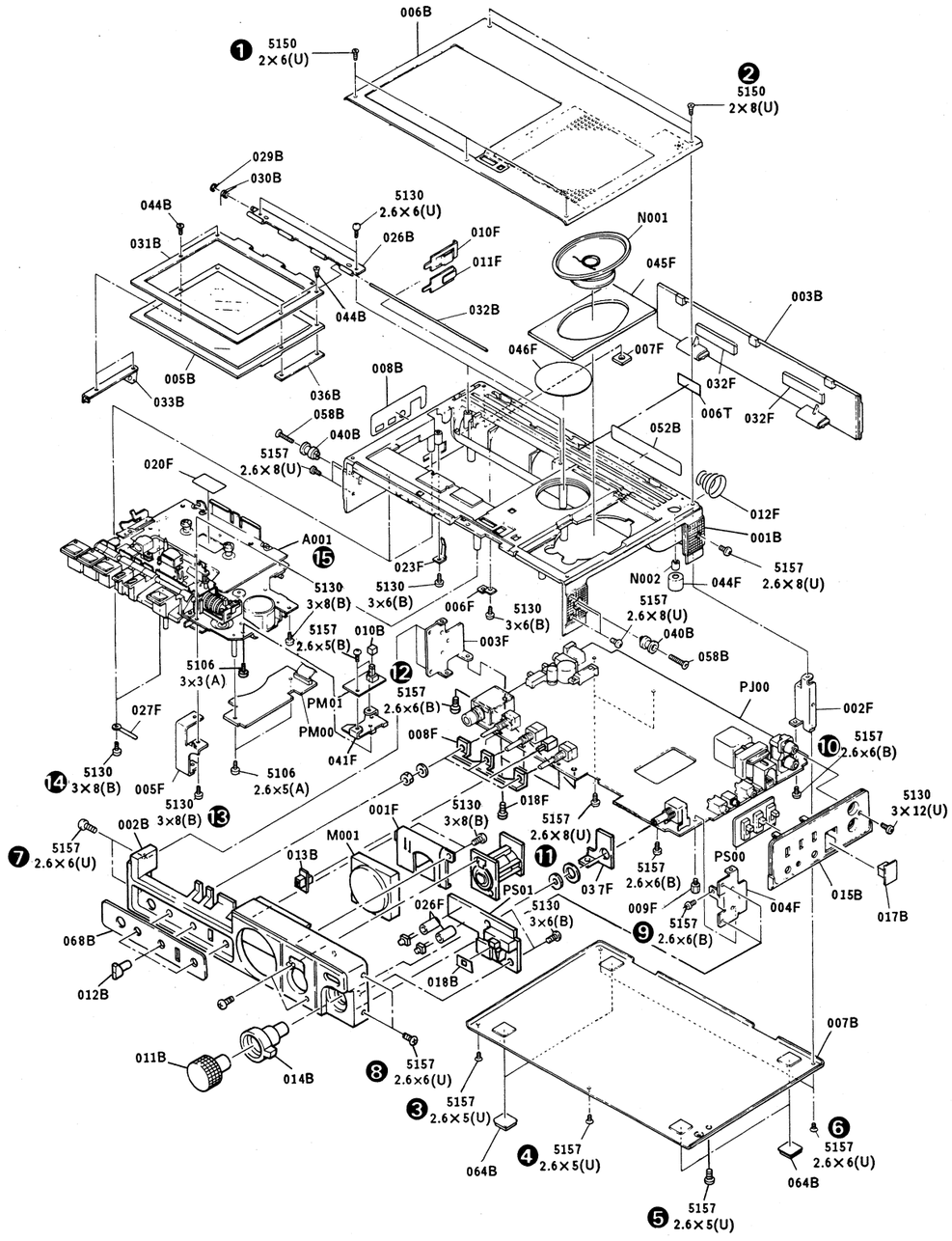
0.001μF (1000pF)...102	0.1μF...104
0.0018μF.....182	0.56μF...564
0.01μF.....103	1μF...105
0.015μF.....153	

REF. DESIG.	PART NO.	DESCRIPTION
		PE00-XLR CONNECTOR CIRCUIT BOARD
		PE00-MISCELLANEOUS
JE11	4822 267 31358	Jack XLR Connector
		PJ00-REC/PLAY AMP CIRCUIT BOARD
		PJ00-CAPACITORS
CG02	4822 121 43655	Film 0.47μF ±10%
CJ01	5322 122 31626	Ceramic 100pF ±5%
CJ41	4822 122 10367	Ceramic 150pF ±5%
CL07	4822 121 42768	Film 0.012μF ±5%
		PJ00-RESISTORS
R702	4822 100 30096	10KΩ (A) Variable
R707	4822 100 30099	10KΩ (W) Variable
RE18	4822 101 50283	20KΩ (A) VR-SW Componet
RG06	4822 050 24701	470Ω ±5% 1/2W
RJ16	4822 100 11352	22KΩ (B) Trimming
RK01	4822 100 11352	22KΩ (B) Trimming
RL12	4822 100 11471	100KΩ(B) Trimming
RM51	4822 100 30098	500Ω Variable
RM53	4822 100 11386	1KΩ Trimming
RX01	4822 100 11471	100KΩ(B) Trimming
RY32	4822 100 11352	22KΩ (B) Trimming
		PJ00-SEMICONDUCTORS
DE01	4822 130 33305	Diode 1SS133
DE02	4822 130 33305	Diode 1SS133
DE03	4822 130 33305	Diode 1SS133
DG01	4822 130 80317	Zener RD-5.1
DG02	4822 130 80317	Zener RD-5.1
DK01	4822 130 33305	Diode 1SS133
DK02	4822 130 33305	Diode 1SS133
DK03	4822 130 33305	Diode 1SS133
DL01	4822 130 33305	Diode 1SS133
DL05	4822 130 33305	Diode 1SS133
DL06	4822 130 33759	Zener RD-4.7J-B2
DL07	4822 130 33305	Diode 1SS133
DM51	4822 130 80272	Zener RD-7.5J-B2
DX01	4822 130 33305	Diode 1SS133
DY39	4822 130 33305	Diode 1SS133
Q701	4822 209 62229	IC BA527
QE01	4822 209 83631	IC NJM4558 DD
QE02	4822 130 43313	Transistor 2SC3312(R,S),etc
QE03	4822 130 43313	Transistor 2SC3312(R,S),etc
QE04	4822 130 43313	Transistor 2SC3312(R,S),etc
QG01	4822 130 43313	Transistor 2SC3312(R,S),etc

REF. DESIG.	PART NO.	DESCRIPTION
QJ01	4822 130 43313	Transistor 2SC3312(R,S),etc.
QJ02	4822 130 43313	Transistor 2SC3312(R,S),etc.
QJ03	4822 130 42594	Transistor,Digital DTC144ES
QJ04	4822 130 61189	Transistor,Digital DTC114TS
QJ31	4822 130 42594	Transistor,Digital DTC144ES
QK01	4822 209 83631	IC, NJM4558 DD
QK02	4822 130 42594	Transistor,Digital DTC144ES
QK03	4822 130 42594	Transistor,Digital DTC144ES
QK04	4822 130 42594	Transistor,Digital DTC144ES
QK31	4822 130 42594	Transistor,Digital DTC144ES
QK32	4822 130 42594	Transistor,Digital DTC144ES
QK33	4822 130 42594	Transistor,Digital DTC144ES
QL01	4822 130 43347	Transistor 2SD471 L
QL02	4822 130 43347	Transistor 2SD471 L
QL03	4822 130 43347	Transistor 2SD471 L
QL04	4822 130 43313	Transistor 2SC3312(R,S),etc.
QL05	4822 130 42682	Transistor,Digital DTA144ES
QL06	4822 130 42682	Transistor,Digital DTA144ES
QL07	4822 130 42682	Transistor,Digital DTA144ES
QL08	4822 130 43347	Transistor 2SD471 L
QL31	4822 130 61189	Transistor,Digital DTC114TS
QM51	4822 130 43313	Transistor 2SC3312(R,S),etc.
QM52	4822 130 43313	Transistor 2SC3312(R,S),etc.
QM53	4822 130 43313	Transistor 2SC3312(R,S),etc.
QN01	4822 209 83631	IC, NJM4558 DD
QN02	4822 130 61189	Transistor,Digital DTC114TS
QX01	4822 130 43313	Transistor 2SC3312(R,S),etc.
QX02	4822 130 43313	Transistor 2SC3312(R,S),etc.
QY01	4822 130 42594	Transistor,Digital DTC144ES
QY02	4822 130 43313	Transistor 2SC3312(R,S),etc.
QY03	4822 130 43313	Transistor 2SC3312(R,S),etc.
QY38	4822 130 43313	Transistor 2SC3312(R,S),etc.
		PJ00-MISCELLANEOUS
J701	4822 267 31175	Jack Headphone
J702	4822 267 31172	Jack Ext SP
JE01	4822 267 31172	Jack Tel Pick up
JG01	4822 267 30604	Terminal Pin Jack 2P
JG02	4822 267 31173	Jack TEL
JG03	4822 265 10111	Jack Connector
JL01	4822 265 10069	Jack Connector
JL02	4822 265 10085	Jack DC IN
JM51	4822 267 31174	Jack Remote
JY01	4822 265 30805	Jack Connector
LJ41	4822 157 53521	Choke Coil 22mH
LK01	4822 157 62213	Choke Coil 5.6mH
LK02	4822 156 10845	Choke Coil Bias Trap 85kHz
LL01	4822 157 62205	Osc Transf. Bias Osc Coil
LL02	4822 156 10676	Choke Coil 47μH
LL05	4822 146 10145	Osc Transf. DC-DC Converter
LL06	4822 156 10676	Choke Coil 47μH
LL07	4822 157 62204	Choke Coil 1mH
S701	4822 277 30749	Slide Switch, Speaker ON/OFF
SG01	4822 276 20355	Push Switch, T/S

REF. DESIG.	PART NO.	DESCRIPTION
SJ01	4822 277 21391	Slide Switch, Rec/Play
SK01	4822 273 10207	Rotary Switch, Rec Mode
SK02	4822 277 21388	Slide Switch, Tape Select
TG01	4822 140 10387	Transformer, TEL IN/OUT
		PM00-MECHA CONTROL CIRCUIT BOARD
		PM00-CPACITORS
CM01	4822 124 21899	Elect 4.7μF 25V
CM04	4822 124 21894	Elect 10μF 16V
CM05	4822 124 21894	Elect 10μF 16V
CM06	4822 124 41242	Elect 100μF 10V
CM07	4822 122 32678	Elect 22μF 6.3V
CM08	4822 124 41244	Elect 33μF 6.3V
CM10	4822 124 21736	Elect 1μF 50V
		PM00-RESISTORS
RM01	4822 115 90189	0.5Ω ±5% 1/2W
RM03	4822 115 90191	10kΩ ±5% 1/2W
RM04	4822 101 30706	3.3kΩ (B) Trimming
RM13	4822 116 60204	4.7Ω ±5% 1W
		PM00-SEMICONDUCTORS
DM01	4822 130 43408	Diode Chip MA151WK
DM02	4822 130 32508	Diode RL103E,etc 200V 1A
DM03	4822 130 43408	Diode Chip MA151WK
DM04	4822 130 43408	Diode Chip MA151WK
DM05	4822 130 43408	Diode Chip MA151WK
DM06	4822 130 43408	Diode Chip MA151WK
DM07	4822 130 43408	Diode Chip MA151WK
DM08	4822 130 32874	Zener MA3075
QM01	4822 209 83693	IC AN6612
QM02	5322 130 61158	Transistor 2SA881
QM03	4822 130 60749	Transistor 2SD1328 R,S Chip
QM04	4822 130 62236	Transistor,Digital DTC124EK
QM05	4822 130 60749	Transistor 2SD1328 R,S Chip
QM06	4822 130 62236	Transistor,Digital DTC124EK
QM07	4822 209 82278	IC DN6864
QM08	4822 209 83699	IC BA668
		PM01-MEMORY SW CIRCUIT BOARD
		PM01-MISCELLANEOUS
SM01	4822 413 20147	Push Switch Memory Rew.
		PS00-INPUT SELECT CIRCUIT BOARD
		PS00-MISCELLANEOUS
SS01	4822 277 21389	Slide Switch Input Select
SS02	4822 277 21389	Slide Switch Anc Select
SS03	4822 277 21389	Slide Switch Mic Att.
		PS01-TAPE SPEED SELECT CIRCUIT BOARD
		PS01-SEMICONDUCTORS
DY08	4822 130 81358	LED Rec Ind. LN228PR
DY28	4822 130 33173	LED Batt Ind. LN222RP
DY38	4822 130 33173	LED Peak Ind. LN222RP
		PS01-MISCELLANEOUS
SS04	4822 277 30751	Slide Switch Tape Speed

13. EXPLODED VIEW/DISASSEMBLY AND PARTS LIST(U.S.A. only)



DISASSEMBLY

1. Removing the cover(A) : Top (006B)
   Remove the 5 screws ❶ and ❷.

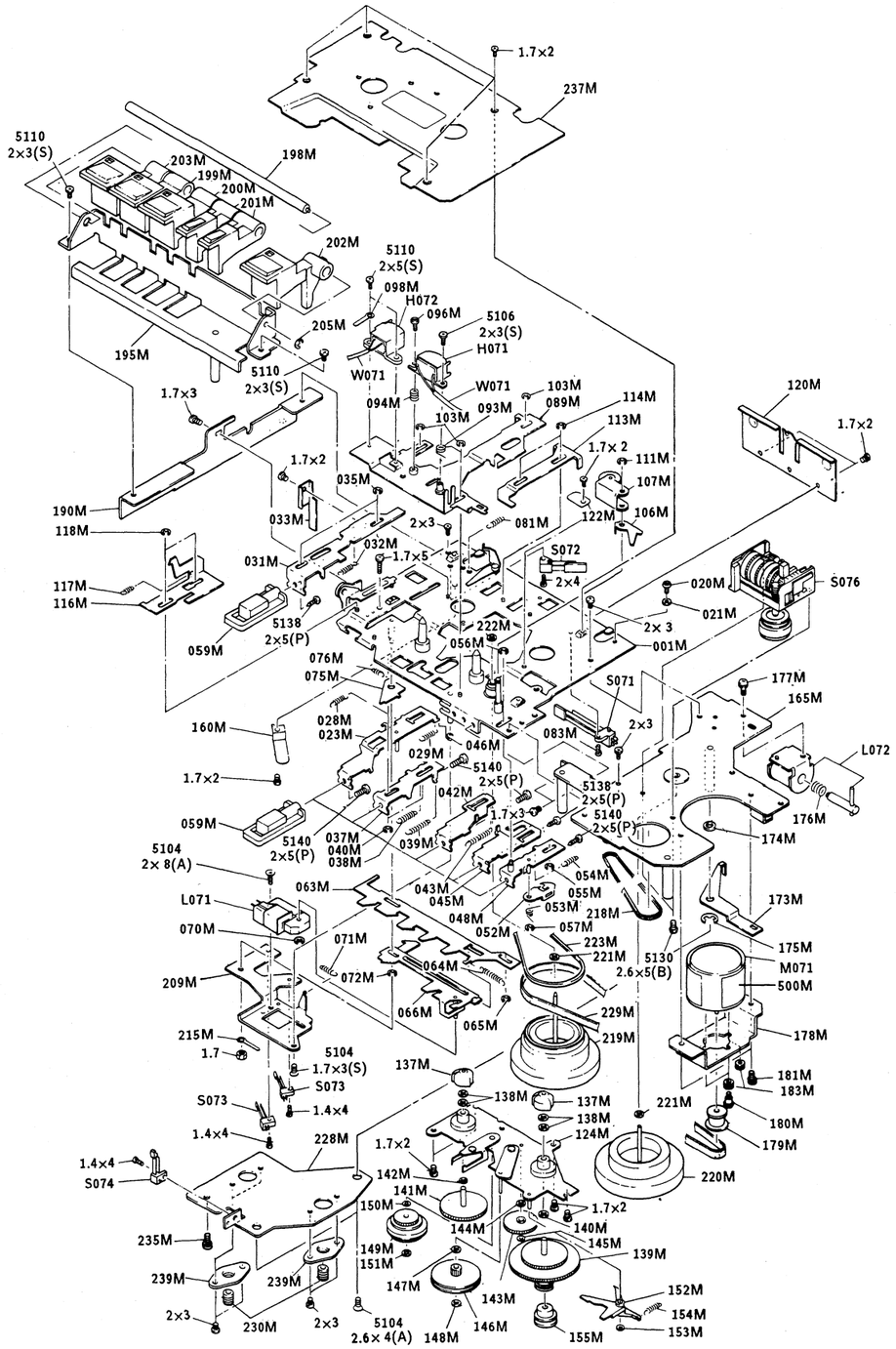
2. Removing the cover(B) : Bottom (007B)
   Remove the 5 screws ❸, ❹, ❺ and ❻.

3. Removing the front panel (002B)
   1) Remove the knob (011B), (014B) and (012B).
   2) Remove the 4 screws ❼ and ❽.

4. Removing the main P.C. Board (PJ00)
   1) Remove the stud (009F)
   2) Remove the 6 screws ❾, ❿, ⓫ and ⓬.

5. Removing the mechanism (A001)
   Remove the 4 screws ⓭, ⓮ and ⓯.

REF. DESIG.	PART NO.	DESCRIPTION
001B	153T064060	Case (A), Top
002B	436T248010	Front Panel
003B	153T257010	Lid, Battery
005B	436T257030	Lid, (C) Cassette
006B	436T053010	Cover (A), Top
007B	436T053020	Cover (B), Bottom
008B	196T861110	Label, Case (A)
010B	196T270010	Memory REW Button
011B	436T154010	Knob, REC Level
012B	153T154130	Knob, LEVEL, TONE, PITCH, REC MODE
013B	153T154040	Knob, TAPE, SOURCE
014B	436T154020	Knob REC mode mold
015B	436T265020	Indicator, For Side(R)
018B	436T303010	Indicator For Tape speed
026B	153T153500	Hinge Ass'y (A)
029B	64002500R0	RG Ring, E
030B	153T115090	Spring
031B	153T153020	Hinge (B)
040B	153T055010	Collar
044B	51840204S0	F.H.M. Screw F2×4
058B	51580318U0	F.H.M. Screw F3×18
064B	153T057000	Leg, Cover (B)
068B	436T265010	Indicator Front
010F	153T129010	Terminal (+)
011F	153T129020	Terminal
012F	YL11010090	Terminal (-)
018F	51592605B0	P. Tapped Screw P2.6×4
020F	251T274010	Reflector
023F	153T115100	Spring
A001		Mechanism Assembly
M001	IM31040030	V.U. Meter
N001	QJ72478010	Speaker 4Ω 0.5W
N002	MS50000150	Mic Unit, ECM
001T	436T851210	User Manual
001V	153T156010	Strap
ZA01	AA12005020	A.C. Adaptor



REF. DESIG.	PART NO.	DESCRIPTION
020M	153T010090	Screw
021M	59020402G9	Washer
025M	153T002030	STOP/EJECT Select Cam
026M	153T112110	FIX S/E Select Cam
028M	251T11510R	Spring, S/F Select Cam
029M	153T115170	Spring, Stop Lever
032M	153T115210	Spring, REC Lever
034M	254T010200	REC SW S1.7×2
035M	64001500L0	RG Ring, REC Lever
038M	251T115220	Spring, Head Base
039M	251T11511R	Spring, FWD Lever
040M	64001500L0	RG Ring, FWD Lever
043M	251T11513R	Spring, REW Lever
046M	242T11516R	Spring, FF Lever
052M	153T002040	Arm, Pause Lock Cam
053M	153T115060	Spring, Pause Lock Cam
054M	153T115140	Spring, Pause Lever
055M	64001500L0	RG Ring, Pause Lever
056M	64000200L0	RG Ring, Pause Lever
057M	64001500L0	RG Ring, Pause Cam
063M	153T054010	Cam, Lock Plate
064M	153T115160	Spring, Lock Plate
065M	64001500L0	RG Ring, Lock Plate
066M	153T054500	Cam, QMS Lock Plate Ass'y
070M	64001500L0	RG Ring, E
071M	251T11514R	Spring, QMS Lock Plate
072M	64000200L0	RG Ring, Lock Plate
076M	251T11515R	Spring, REC Inter Lock
081M	153T115250	Spring, REC Safety
083M		F.H.M. Screw F1.7×3
093M	154T115190	Spring, Pinch Roller
094M	154T115020	Spring, Azimuth
096M	154T010190	Screw, Azimuth
103M	64001500L0	RG Ring, Head Base
107M	153T002590	Arm Ass'y, Pinch Roller
111M	64001500L0	RG Ring, Pinch Arm
114M	64001500L0	RG Ring, Switch C/R Lever
117M	251T11517R	Spring, Hook Lever
118M	64001500L0	RG Ring, Hook Lever
120M	153T115010	Spring, Cassette Back
137M	153T256050	Hub, Take-Up & S Reel Cap
138M	59020405G9	Washer, Under Reel Cap
139M	153T058010	Gear, Take-Up Reel Gear Ass'y
140M	59020402G9	Washer, Under Clutch
141M	153T058020	Gear, Supply Reel Gear Ass'y
142M	59020402G9	Washer, Under Supply Reel Ass'y
143M	242T05811R	Gear, FF
144M	59020402G9	Washer, Under FF Gear
145M	254T012220	Washer, FF Gear
146M	242T26210R	Pulley, FWD Idler
147M	59163202G9	Washer, Under FWD Idler
148M	153T118130	Spacer, FWD Idler
149M	242T26211R	Center Pulley Ass'y
150M	153T118120	Spacer, Under C Clutch
151M	153T118130	Spacer, C Pulley Ass'y

REF. DESIG.	PART NO.	DESCRIPTION
152M	242T00210R	Arm, Shut Off
153M	254T012230	Washer, Shut OFF Arm
154M	153T115040	Spring, Shut OFF Arm
155M	153T262020	Pulley, Counter Pulley
160M	153T115020	Spring, Leaf
174M	59050805G9	Washer, Auto Stop Link
175M	64000400LR	RG Ring, Auto Stop Link
176M	153T115030	Spring, Auto Stop Solenoid
177M	51442604A0	L. Washer Screw L2.6×4
179M	195T262240	Motor Pulley 2400RPM
180M	254T010250	Screw, Motor
181M	51442604A0	L. Washer Screw L2.6×4
183M	254T259200	Bushing, Motor
199M	153T270010	Button, Stop
200M	153T270020	Button, FWD
201M	153T270030	Button, REW & FF
202M	153T270040	Button, Pause
203M	153T270050	Button, REC
205M	64000200L0	RG Ring, Button Shaft
218M	153T264020	Belt, Counter
219M	153T273110	Flywheel Ass'y, Main
220M	153T273020	Flywheel Ass'y, Sub
221M	59163202G9	Washer, Under Flywheels
222M	153T118110	Spacer, Oil Fence
223M	242T26412R	Belt, Drive
229M	153T264010	Belt, Main
230M	153T164010	Adjuster
235M	51442604A0	L. Washer Screw L2.6×4
239M	153T104010	Retainer
H071	LH82162030	REC/Play Head
H072	LH31000570	Erase Head
L071	ME0014004R	Solenoid Coil, QMS Auto REW
L072	ME10180010	Solenoid Coil, Auto Stop
M071	MM00450020	D.C. Motor
S071	SM02010180	Mini Switch, Motor
S072	SM0101114R	Mini Switch, F/R
S073	SM0101121R	Mini Switch, Play/Stop
S074	SM0101121R	Mini Switch, Pause
S076	153T052010	Counter

14. ELECTRICAL PARTS LIST (U.S.A. only)

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W

① — Resistance value

Examples

① Resistance value

0.1Ω...001	10Ω...100	1kΩ...102	100kΩ...104
0.5Ω...005	18Ω...180	2.7kΩ...272	680kΩ...684
1Ω...010	100Ω...101	10kΩ...103	1MΩ...105
6.8Ω...068	390Ω...391	22kΩ...223	4.7MΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.

(1) DD1---370, Ceramic condenser
Disc type
①② Temp. coeff. P350 ~ N1000, 50V
Capacity value
Tolerance

Examples

① Tolerance (Capacity deviation)
±0.25pF...0
±0.5pF...1
±5%...5

* Tolerance of COMMON PARTS handled here are as follows:
0.5pF ~ 5pF...±0.25pF
6pF ~ 10pF...±0.5pF
12pF ~ 560pF...±5%

② Capacity value

0.5pF...005	3pF...030	100pF...101
1pF...010	10pF...100	220pF...221
1.5pF...015	47pF...470	560pF...561

C***: CERAMIC CAP.

(1) DK16---300, High dielectric constant ceramic condenser
Disc type
① Temp. chara. 2B4, 50V
Capacity value

Example

② Capacity value

100pF...101	1000pF...102	10000pF...103
470pF...471	2200pF...222	

C***: ELECTROLY CAP. (⏚), FILM CAP. (⏦)

(1) EA------10, Electrolytic condenser
One-way lead type, Tolerance ±20%
①②
Dielectric strength
Capacity value

Examples

① Capacity value

0.1μF...104	4.7μF...475	100μF...107
0.33μF...334	10μF...106	330μF...337
1μF...105	22μF...226	1100μF...108
		2200μF...228

② Working voltage

6.3V...006	25V...025
10V...010	35V...035
16V...016	50V...050

(2) DF15---350, Plastic film condenser
One-way type, Mylar ±5% 50V
①
Capacity value

Examples

① Capacity value

0.001μF (1000pF)...102	0.1μF...104
0.0018μF.....182	0.56μF...564
0.01μF.....103	1μF...105
0.015μF.....153	

REF. DESIG.	PART NO.	DESCRIPTION
		PE00-XLR CONNECTOR CIRCUIT BOARD
		PE00-MISCELLANEOUS
JE11	YJ01003480	Jack XLR Connector
		PJ00-REC/PLAY AMP CIRCUIT BOARD
		PJ00-CAPACITORS
CG02	DF16474530	Film 0.47μF ±10%
CJ01	DD15101300	Ceramic 100pF ±5%
CJ41	DD15151300	Ceramic 150pF ±5%
CL07	DF15123550	Film 0.012μF ±5%
		PJ00-RESISTORS
R702	RK01030520	10KΩ (A) Variable
R707	RM01030270	10KΩ (W) Variable
RE18	BR02030020	20KΩ (A) VR-SW Componet
RG06	GG05471120	470Ω ±5% 1/2W
RJ16	RA02230780	22KΩ (B) Trimming
RK01	RA02230780	22KΩ (B) Trimming
RL12	RA01040780	100KΩ(B) Trimming
RM51	RK05010060	500Ω Variable
RM53	RA01020780	1KΩ Trimming
RX01	RA01040780	100KΩ(B) Trimming
RY32	RA02230780	22KΩ (B) Trimming
		PJ00-SEMICONDUCTORS
DE01	HD20002000	Diode 1SS133
DE02	HD20002000	Diode 1SS133
DE03	HD20002000	Diode 1SS133
DG01	HD30511000	Zener RD-5.1
DG02	HD30511000	Zener RD-5.1
DK01	HD20002000	Diode 1SS133
DK02	HD20002000	Diode 1SS133
DK03	HD20002000	Diode 1SS133
DL01	HD20002000	Diode 1SS133
DL05	HD20002000	Diode 1SS133
DL06	HD30471000	Zener RD-4.7J-B2
DL07	HD20002000	Diode 1SS133
DM51	HD30751000	Zener RD-7.5J-B2
DX01	HD20002000	Diode 1SS133
DY39	HD20002000	Diode 1SS133
Q701	HC10055210	IC BA527
QE01	HC10008090	IC NJM4558 DD
QE02	HT30002000	Transistor 2SC3312(R,S),etc
QE03	HT30002000	Transistor 2SC3312(R,S),etc
QE04	HT30002000	Transistor 2SC3312(R,S),etc
QG01	HT30002000	Transistor 2SC3312(R,S),etc

REF. DESIG.	PART NO.	DESCRIPTION
QJ01	HT30002000	Transistor 2SC3312(R,S),etc.
QJ02	HT30002000	Transistor 2SC3312(R,S),etc.
QJ03	BA20012210	Transistor,Digital DTC144ES
QJ04	BA20017210	Transistor,Digital DTC114TS
QJ31	BA20012210	Transistor,Digital DTC144ES
QK01	HC10008090	IC NJM4558 DD
QK02	BA20012210	Transistor,Digital DTC144ES
QK03	BA20012210	Transistor,Digital DTC144ES
QK04	BA20012210	Transistor,Digital DTC144ES
QK31	BA20012210	Transistor,Digital DTC144ES
QK32	BA20012210	Transistor,Digital DTC144ES
QK33	BA20012210	Transistor,Digital DTC144ES
QL01	HT404711L0	Transistor 2SD471 L
QL02	HT404711L0	Transistor 2SD471 L
QL03	HT404711L0	Transistor 2SD471 L
QL04	HT30002000	Transistor 2SC3312(R,S),etc.
QL05	BA10010210	Transistor,Digital DTA144ES
QL06	BA10010210	Transistor,Digital DTA144ES
QL07	BA10010210	Transistor,Digital DTA144ES
QL08	HT404711L0	Transistor 2SD471 L
QL31	BA20017210	Transistor,Digital DTC114TS
QM51	HT30002000	Transistor 2SC3312(R,S),etc.
QM52	HT30002000	Transistor 2SC3312(R,S),etc.
QM53	HT30002000	Transistor 2SC3312(R,S),etc.
QN01	HC10008090	IC NJM4558 DD
QN02	BA20017210	Transistor,Digital DTC114TS
QX01	HT30002000	Transistor 2SC3312(R,S),etc.
QX02	HT30002000	Transistor 2SC3312(R,S),etc.
QY01	BA20012210	Transistor,Digital DTC144ES
QY02	HT30002000	Transistor 2SC3312(R,S),etc.
QY03	HT30002000	Transistor 2SC3312(R,S),etc.
QY38	HT30002000	Transistor 2SC3312(R,S),etc.
		PJ00-MISCELLANEOUS
J701	YJ01002560	Jack Headphone
J702	YJ01002160	Jack Ext SP
JE01	YJ01002160	Jack Tel Pick up
JG01	YT02020280	Terminal Pin Jack 2P
JG02	YJ01002430	Jack TEL
JG03	YJ06003020	Jack Connector
JL01	YJ06003110	Jack Connector
JL02	YJ04000840	Jack DC IN
JM51	YJ01002440	Jack Remote
JY01	YP06004860	Jack Connector
LJ41	LC22260710	Choke Coil 22mH
LK01	LC25650710	Choke Coil 5.6mH
LK02	LC24760520	Choke Coil Bias Trap 85kHz
LL01	TC10150070	Osc Transf. Bias Osc Coil
LL02	LC14730040	Choke Coil 47μH
LL05	TC10200090	Osc Transf. DC-DC Converter
LL06	LC14730040	Choke Coil 47μH
LL07	LC21050710	Choke Coil 1mH
S701	SS02020740	Slide Switch, Speaker ON/OFF
SG01	SP02020730	Push Switch, T/S

REF. DESIG.	PART NO.	DESCRIPTION
SJ01	SS06020570	Slide Switch, Rec/Play
SK01	SR02030130	Rotary Switch, Rec Mode
SK02	SS02030230	Slide Switch, Tape Select
TG01	TO12414010	Transformer, TEL IN/OUT
		PM00-MECHA CONTROL CIRCUIT BOARD
		PM00-CPACITORS
CM01	EJ47502510	Elect 4.7μF 25V
CM04	EJ10601610	Elect 10μF 16V
CM05	EJ10601610	Elect 10μF 16V
CM06	EJ10701010	Elect 100μF 10V
CM07	EJ22600610	Elect 22μF 6.3V
CM08	EJ33600610	Elect 33μF 6.3V
CM10	EJ10505010	Elect 1μF 50V
		PM00-RESISTORS
RM01	NB50052390	0.5Ω ±5% 1/2W
RM03	NB51032200	10kΩ ±5% 1/2W
RM04	RA03320600	3.3kΩ (B) Trimming
RM13	GA05047010	4.7Ω ±5% 1W
		PM00-SEMICONDUCTORS
DM01	HZ20001020	Diode Chip MA151WK
DM02	HD20003000	Diode RL103E,etc 200V 1A
DM03	HZ20001020	Diode Chip MA151WK
DM04	HZ20001020	Diode Chip MA151WK
DM05	HZ20001020	Diode Chip MA151WK
DM06	HZ20001020	Diode Chip MA151WK
DM07	HZ20001020	Diode Chip MA151WK
DM08	HZ30003020	Zener MA3075
QM01	HC10037020	IC AN6612
QM02	HT108811Q0	Transistor 2SA881
QM03	HX413282A0	Transistor 2SD1328 R,S Chip
QM04	BA2000221R	Transistor,Digital DTC124EK
QM05	HX413282A0	Transistor 2SD1328 R,S Chip
QM06	BA2000221R	Transistor,Digital DTC124EK
QM07	HC10024020	IC DN6864
QM08	HC10039210	IC BA668
		PM01-MEMORY SW CIRCUIT BOARD
		PM01-MISCELLANEOUS
SM01	SP02020840	Push Switch Memory Rew.
		PS00-INPUT SELECT CIRCUIT BOARD
		PS00-MISCELLANEOUS
SS01	SS02030290	Slide Switch Input Select
SS02	SS02030290	Slide Switch Anc Select
SS03	SS02030290	Slide Switch Mic Att.
		PS01-TAPE SPEED SELECT CIRCUIT BOARD
		PS01-SEMICONDUCTORS
DY08	HI10056020	LED Rec Ind. LN228PR
DY28	HI10025020	LED Batt Ind. LN222RP
DY38	HI10025020	LED Peak Ind. LN222RP
		PS01-MISCELLANEOUS
SS04	SS02020760	Slide Switch Tape Speed